CX – 18

Summary of Suction Dredging Impacts

David Arthaud, NMFS Boise, Idaho August 1, 2014

Species Effects

The entire South Fork Clearwater River (SFCLW) is designated critical habitat for steelhead listed as threatened under the Endangered Species Act (ESA).

The entire SFCLW also includes Chinook and coho salmon Essential Fish Habitat, identified by the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Preferred spawning habitat is mostly in tributaries, but from its headwaters downstream at least to Tenmile Creek, the SFCLW includes steelhead spawning and rearing habitat. IDFG surveys find low to moderate densities of steelhead throughout the SFCLW mainstem and its tributaries. Steelhead redd survey data are rare due to reduced visibility during spring high flows, but Chinook salmon redds were found throughout the upper SFCLW and tributaries, which is a good surrogate indicating the reach includes spawning habitat for steelhead, particularly larger and older fish that can build deeper nests in larger cobbles.

Generally the SFCLW is shallow river habitat. Spawning and rearing quality varies from good to poor with habitat quality throughout reduced by physical substrate habitat alterations, fine sediment/siltation, and warm temperatures (CWA 303d listed), largely caused by mining. Suction dredge mining directly contributes to this degraded baseline and slows restoration.

Even small amounts of fine sediment that reduce oxygen in interstitial spaces readily lower survival of eggs and alevins. Fine sediment reduces growth and production of older juveniles by reducing cover to escape predators and decreasing preferred forage. During winter virtually all juveniles hide inside substrates during daylight. Suspended fine sediments can directly cause a full range of injuries with denser, wider and longer plumes generally increasing adverse effects. Fine sediments in plumes settle in slower velocity substrates, filling pools or creating a film of silt in shallow areas that reduces invertebrate production, which limits the growth and production of steelhead. Reduced growth in young fish transfers small size to later life stages and significantly reduces survival during smolt migration and ocean entry.

Steelhead Exposure to Suction Dredging

June 30 to July 15. Steelhead spawn throughout spring and small proportions of steelhead alevins are expected to remain in or near redds until mid-July. Some adults spawn late and cold water temperatures slow development of eggs and alevins. Alevins and fry often remain in or

near redds for a few days or weeks before dispersing to shallow water along banks or riffles. When disturbed they swim beneath cobbles, remain in hiding, and can be crushed, sucked through dredges or impinged on screens. Young, small fish are most at risk of injury or death from crushing and entrainment.

July 15 to August 15. Juvenile steelhead from 0 to 4 years of age and about 1 to 12 inches in length rear in and move through almost every reach of river. Competition for food and space (which must include access beneath substrates, banks, or other cover) and predation are intense. These fish react to disturbance individually or in schools by darting away from potential danger and if pressed by hiding in escape cover. Escape cover is usually vegetation and substrate for small fish and more complex cover, undercut banks, and larger substrates for larger fish. At least small proportions of larger juveniles will hide and refuse to exit, even if exposed to crushing or entrainment.

After August 15. Steelhead juveniles continue to rear and many migrate downstream throughout fall and early winter. Chinook salmon spawn from August-September and coho salmon spawn from October-December.

Habitat Effects

Physical habitat is altered and quality may be reduced through sediment deposition, substrate and bank alteration. Boulders and larger cobble, may not move for many years, so when boulders are moved or undercut and not replaced by miners, siltation and water temperatures may increase reducing habitat quality and stability. Dredge tailings are often piled on top of escape cover and interstitial spaces. Gravels are piled, cleaned, and sorted that can fill or dam pools or be left unstable, leading fish to spawn there and then readily scour, killing eggs/alevins inside nests. Summertime alterations remain intact through winter, covering spaces in substrates that juvenile salmonids require to shelter (hide beneath substrate) during daylight. When underground spaces are filled or covered with silt or gravel, fish will not overwinter in that area. Lack of overwintering habitat forces juveniles to move downstream and can limit population productivity. Dredge alterations will remain intact until after adult steelhead spawn the following spring, leading to increased scour of redds during high flows.

In the SFCLW siltation has reduced cover and water depth and increased water temperatures. Dredges and associated disturbance can physically block fish passage in small rivers, side channels, and tributary mouths, exacerbating stress and predation upon juvenile steelhead. Dredge mining can create extended disturbances limiting primary feeding times and displacing juveniles from preferred feeding locations. Dredge tailings can dam the stream channel and

destabilize or alter hydraulics and hyporheic flow along preferred spawning sites on gravel bars and tails of pools.

Periphyton communities and benthos, which serve as a base for lotic ecosystems, are removed by dredging and may require months or seasons to reinvade, reestablish, and begin producing invertebrate forage preferred by salmonids.

Without careful application of best management practices, interrelated effects of petroleum contamination or damage to riparian vegetation and streambanks can occur when moving dredges, associated equipment, and trampling during extended periods of mining.

Environmental impacts typically increase with increased duration of dredging activity per day and cumulatively by season and with increased areal size and density of disturbance. Larger dredges have more power to move and pile more substrate, create more turbidity, and excavate deeper and larger holes in stream bottoms. Increased suction and excavation speed also increase entrainment of fish hiding in substrate.

Toxicants and heavy metals (i.e., copper, mercury) in sediment can be resuspended by dredging, particularly from areas like the SFCLW that are already contaminated by mining.

Habitat alterations tend to be most adverse when fish are present in degraded habitat and when dredges are operated in natural spawning areas such as gravel bars at pool tailouts, near channel forming woody debris or boulders, and side channels. Impacts affecting habitat of rearing fish are greater near or under banks, boulders, pool forming bars or woody debris, and near tributary mouths.